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THE USE OF A POWER SNARE TO CAPTURE BREEDING GOLDEN EAGLES

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Adult golden eagles (*Aquila chrysaetos*) are difficult to capture. However, golden eagles of all age classes have been caught using a variety of methods: Harmata (1985) used padded-jaw traps, Ellis (1975) used helicopters and O'Gara and Getz (1986) and S. Brodeur (pers. comm.) used net guns fired from helicopters, Bloom (1987) used pit traps, Jackman et al. (1994) used power snares, and W.S. Clark (pers. comm.) used bow nets.

In western Scotland, where our study took place, it is illegal to use live lures, winters are mild with little snow cover, and the eagle population is nonmigratory. This paper describes a safe, inexpensive, and reliable method of catching breeding golden eagles without the use of live lures. It also compares the efficiency of this trap to other methods and discusses its impact upon the eagles.

METHODS AND MATERIALS

The trap (Fig. 1) is a modification of a power snare (Hertog 1987), and the radio-controlled trigger (Fig. 2) is similar to that described by Jackman et al. (1994). Table 1 lists the parts and their approximate prices.

We used a shock cord 10 m in length and 5 mm in diameter in most situations, and stretched it to achieve noose closure with 1–2 kg of tension. The length of elastic needed was determined by the size of noose to be closed. The tension was set using a spring balance. The diameter of the noose could be adapted to the situation, but was typically 30–35 cm. To close a noose this size our 10 m elastic was stretched to about 30 m. At the end of the noose-line, a small (3 mm) eyelet was affixed by tying the noose around the outside of the eyelet and locking the knot with Superglue. This ensured that the noose closed quickly and smoothly.

The trigger mechanism was designed to avoid inadvertant firing: the pin which holds the rat-trap armature fits into a deep sleeve, and the connection between the rat-trap and the trigger pin is a flexible nylon cord, ensuring that any vibration at the trigger pin would not be transferred to the rat trap. The radio controls are sometimes affected by radio signals from other sources (especially around harbors) which can fire the trap accidentally, so radio controls with changeable crystals were used.

To avoid injury, a nest anchor was used to keep the captured eagle on the nest, but away from the nestling. This was usually a large (85 cm long) corkscrew with a sailing cleat attached to the top. The cleat allows the noose-line to travel only in the direction of the trigger, holding the noose closed. We sometimes used a nearby tree (<1 m away) as an anchor, nailing the cleat to the tree above the level of the nest. Otherwise, the cleat can be incorporated into the trigger assembly.

Thin wire (4 mm) or bamboo guides are used to ensure that the closing noose is not fouled by the nesting material, and help lift the noose around the bird's tarsi. The tips of the wires were filed to eliminate sharp points.

Nestlings must be isolated on the nest so that they do not foul the trap before firing, and are well out of the way of the captured parent. This can be done either by placing the nestlings within a small chicken-wire cage or by securing with jesses to a small corkscrew-shaped anchor (made from 3–4 mm steel wire).

Trapping success and safety were highest when the operator had a direct view into the nest. At some nests a video camera facilitated a clear view of the trap.

RESULTS

Eight territorial golden eagles (three males, five females) were captured during the nestling period in 1992 (1), 1993 (4), and 1994 (3). Both members of one pair were captured. In all, attempts were made to capture 10 individuals resulting in an 80% capture success. Successful captures were made having triggered the trap 12 times (75% efficiency). Capture of individual eagles took between 5 hr and 4 d, including trap setup and dismantling time.

No decline in productivity or nesting success was detected following capture, and all nestlings fledged. In the year following capture, all territories at which eagles were captured were active (nests built up), and five of seven pairs laid eggs. In the year subsequent to capture success ($\chi^2 = 0.16$, $P > 0.05$) and productivity ($\chi^2 = 0.27$, $P > 0.05$) were similar to that within the rest of the study area.

Trapping activities probably caused eagles to shift nests more often than they would without disturbance. All trapped eagles used new nests in the year following capture. In comparison, eagles on these territories changed

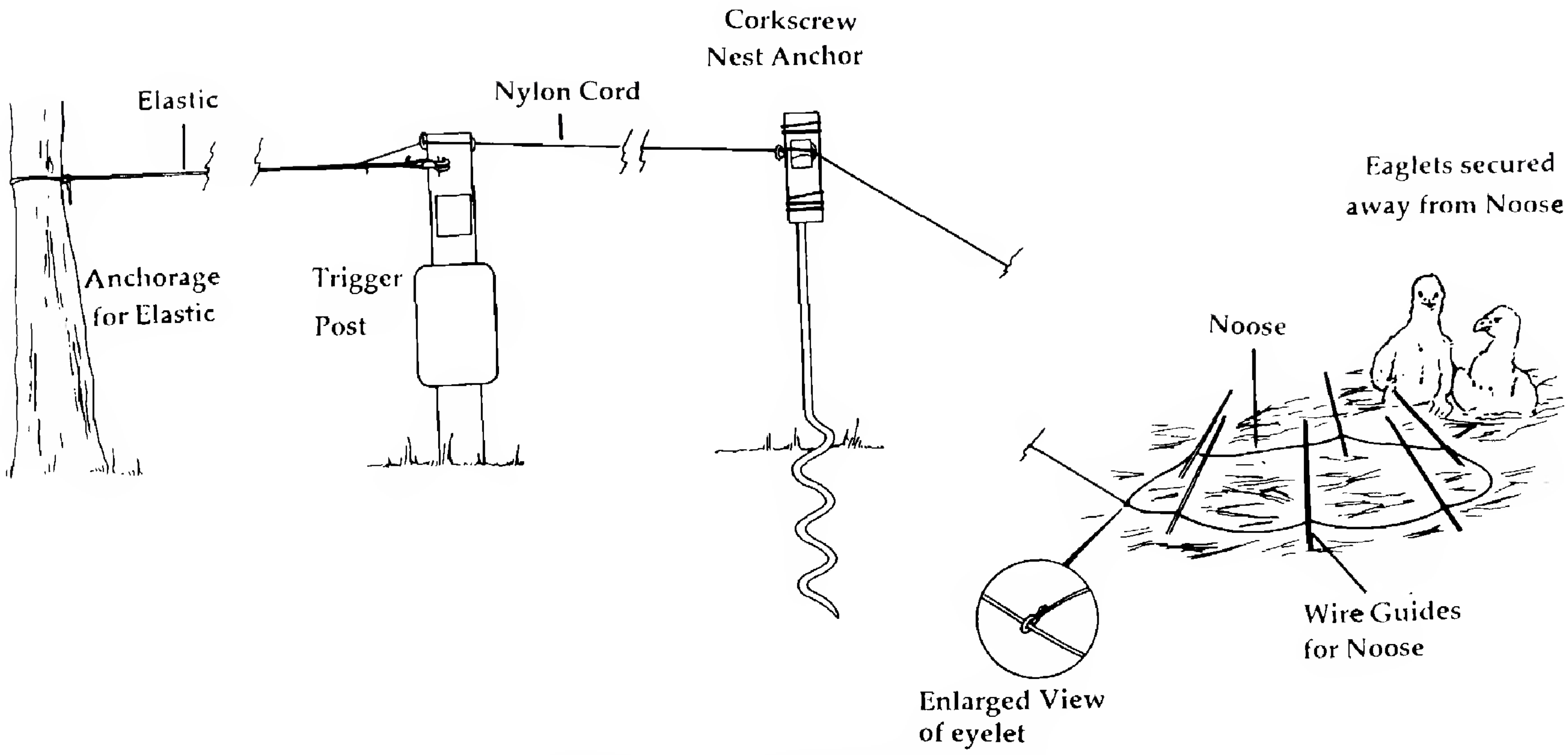

Figure 1. Diagram of the trap setup.

nests only 47 out of 84 nesting attempts (55.9%) in years prior to capture.

DISCUSSION

Territorial golden eagles can be caught on the nest efficiently and safely using the power snare design we describe. Failures to capture birds were due to the lack of a clear view into the nest or fouling of the noose on nest material or prey remains. The age of the nestling also affected the success of trapping because adults visited older nestlings less often, and the large nestlings left no room on the nest for the trap.

No major injury was sustained by any of the captured eagles. Although one was found to be cut on the abdomen, this injury may have been sustained at some other time because the blood surrounding the wound was dry when it was first noticed. Still, as with any trap, there are dangers, and all efforts must be made to ensure safety. Prevost and Baker (1984) reported some fatal injuries when trapping ospreys using a similar trap, although it was triggered automatically. As an additional safety precaution, we would recommend the use of flattened U-shaped wire guides, instead of straight ones.

We found no indication that trapping had any long- or short-term negative effects on the nestlings. No desertions occurred, and in all cases, the trapped bird revisited the nest within 24 hr. In two nests video cameras monitored the post-capture visitation rate by the adults. We were unable to assess whether captured birds took longer to return to their nest than those which had not been captured because of the variability in age of nestlings, weather, and time of day capture occurred.

The effect the trap had upon the adult's return to the nest was difficult to determine. The adults appeared wary, and sometimes flew past the nest before going onto it. Initially, the presence of the nest anchor may have caused the eagles to be reluctant to return to the nest, but one adult returned in less than 2 hr (although it was not in a position to be caught). When eaglets were isolated on the nest using a cage, parents were seen to feed and brood them through the wire mesh. For large nestlings, restraining them with jesses allowed them to stand and move about more freely, and was believed to be less likely to damage growing feathers. However, A. Harmata (pers. comm.) warns that jesses can cause leg tendon injuries, although no obvious injuries to eaglets occurred during our trapping efforts.

It is important that trapping should be conducted only after the nestlings are able to thermoregulate, and only in

Table 1. Trap and trigger components and approximate prices.

Trap	
Elastic cord	$ 6.00
Noose with eyelet	0.50
Nest anchor	10.00
Cleat	5.00
Guides	nil
Anchor	nil
Trigger plate	nil
Radio-controlled trigger	
Radio control and servo	60.00
Battery	8.00
Water resistant box	2.00
Nuts, bolts, etc.	5.00

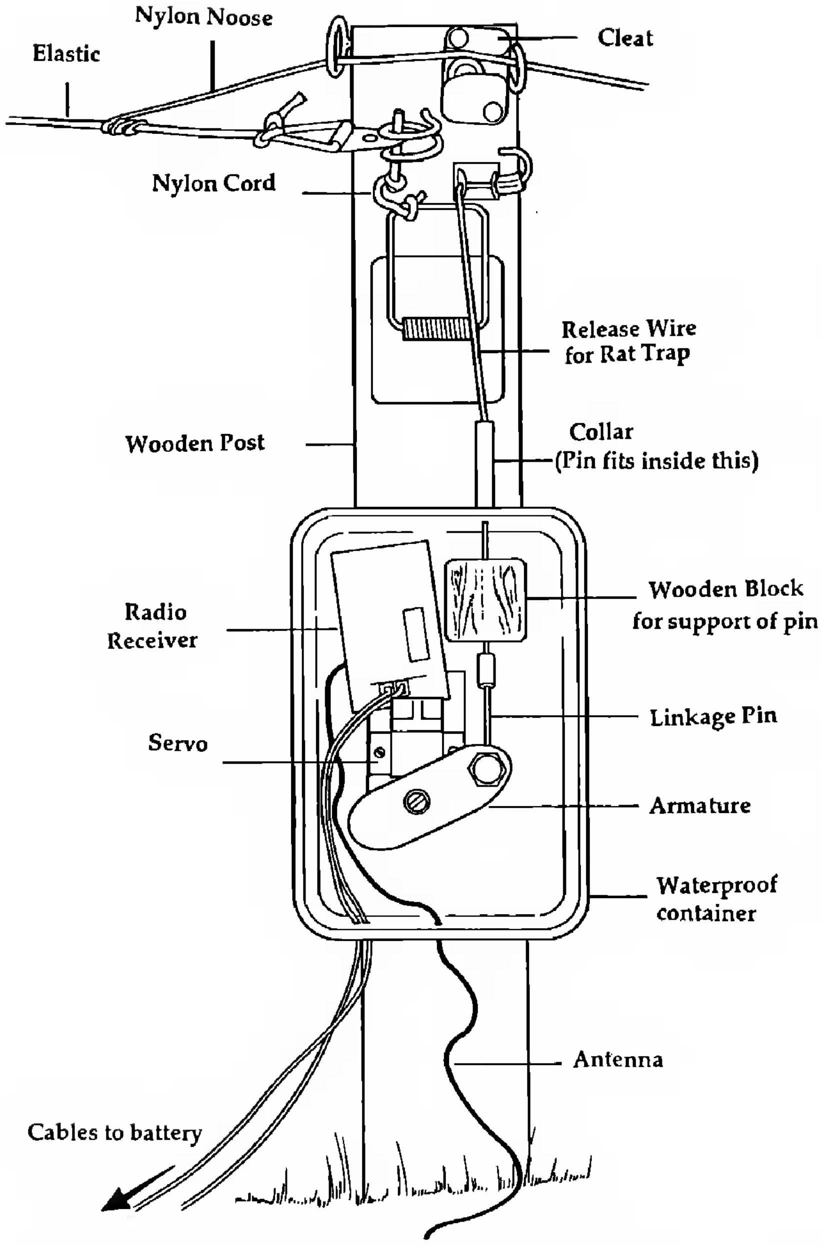

Figure 2. Detail of the radio-controlled trigger mechanism and sailing cleat. When a corkscrew nest anchor is used, the cleat on the trigger mechanism is not used (See Fig. 1).

good weather. Activities should be suspended in the hours prior to sunset to encourage the return of the adult to brood. Whether successful or not, eaglets should be hand-fed by the trapper at the end of each trapping session. In our study area, eagles typically raise only one nestling, although they hatch two. At one site brood reduction occurred the week after cessation of (unsuccessful) trapping activities.

Because golden eagles are big, powerful birds, there is a temptation to set the elastic tension much too strongly. However, success rate was higher when the tension was less. When the tension of the elastic was too great, the whip-like closing of the noose startled the eagle and the noose fell from its feet as it flushed. A lightly set noose closed more gently around the legs of the eagle which was less likely to flush, instead walking around the nest with the noose around both legs. While walking it usually removed one leg from the noose which then closed around the other. Experience suggests that as little as 1.2 kg of tension is needed for golden eagles.

Although this is an efficient method for capturing eagles, we believe that capture outside the breeding season and away from the nest is preferable. Before using this method, one should weigh carefully its potential impact, particularly in areas where the number of nesting places is limited or where there is a difference in success between nesting places within a territory.

RESUMEN.—Como parte de un estudio de radiotelemetría de *Aquila chrysaetos,* una trampa radio-conrolada fue diseñada para capturar individuos reproductivos. La unidad de gatillado incorpora una forma de protección que asegura que la trampa no pueda ser activida más que por el ave blanco. La efectividad de la trampa fue muy alta (80%), especialmente cuando el operador tenía una buena vista del nido (100%). Durante tres estaciones consecutivas, ocho individuos territoriales fueron capturados (tres machos y cinco hembras). No hubo abandonos de nidos y tampoco una reducción de productividad o éxito al año siguiente de las capturas. El trampeo causó más cambios en el sitio de nidificación al año siguiente de las capturas. Por lo tanto, este método puede ser usado solamente cuando muchos lugares de nidificación igualmente apetecibles estan disponibles en el territorio. Aunque efectivo, nostros sugerimos otros métodos, menos intrusivos, para lo captura en nido.

[Traducción de Ivan Lazo]

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A MECHANICAL OWL AS A TRAPPING LURE FOR RAPTORS

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KEY WORDS: Bubo virginianus; *capture technique*; *great horned owl*; *lure*; *mechanical owl*; *mist net.*

A live great horned owl (*Bubo virginianus*) used as a decoy is an effective method for capturing several species of breeding raptors (Hamerstrom 1963, Bloom et al. 1992, Steenhof et al. 1994). Similar techniques were practiced by Arab and Persian falconers (Meredith 1943). Taxidermy mounts of great horned owls have also been used successfully to capture breeding raptors, but are not as effective as a live owl (Bloom 1987). Gard et al. (1989) reported breeding American kestrels (*Falco sparverius*) responded less aggressively to a mounted great horned owl than to a live owl, suggesting that the lack of movement or some other subtle cue by the mounted owl may account for the lower response rate. However, logistics (e.g., weather conditions, remote nest sites, maintenance of owl, legal constraints) sometimes warrant the use of a mounted owl as a substitute for a live great horned owl. Here, I describe the materials used to construct a moving mechanical owl and compared the results of my trapping efforts with this lure to other studies using a live and mounted (taxidermic) great horned owl.

METHODS

Materials and Assembly. A two-channel remote control unit (transmitter, receiver, battery pack, and two servo mechanisms) designed for a model car was slightly modified to provide movement to a mounted great horned owl. The owl's head and body were separated and mounted independently using standard taxidermy procedures. The mechanical owl's body was attached to a horizontal wooden perch (9 cm dia. × 20 cm). A piece of styrofoam was excised from the body of the mechanical owl at the top center and fitted with servo A (Fig. 1). Two vertical pins (3 mm dia. × 10 cm) were glued into the control arm of servo A and two corresponding sleeves were glued into the styrofoam head of the mechanical owl. Servo A supported and provided movement to the mechanical owl's head Servo B was placed in a holding bracket constructed of sheet metal and attached to an aluminum rod (7 mm dia. × 1 m) used to support the mechanical owl's perch. In the underside of the mechanical owl's perch, I inserted a copper sleeve (9 mm dia. × 12 cm) into the center and a pin (4 mm dia. × 11 cm) at one end with approximately half of the pin exposed. To provide movement to the entire mount, servo B's control arm was modified with a piece of tempered wire (3 mm dia. × 30 cm) bent in half and attached at both ends to the control arm. The mechanical owl and perch assembly were positioned on top of the aluminum rod, elevating the owl 1 m above the ground and allowing rotation of the mount. Servo B provided movement to the entire mount, allowing the observer to control movement of the entire mount and the mechanical owl's head independently.

Method of Use. From 1989 through 1995, the mechanical owl was tested on breeding sharp-shinned hawks (*Accipiter striatus*), red-shouldered hawks (*Buteo lineatus*), and Cooper's hawks (*Accipiter cooperii*). A response was considered to have occurred when the target species stooped at least once within 1.5 m of the mechanical owl's head. During the nestling stage the mechanical owl was centered <1 m from the net, in view of and <50 m from the nest. An observer concealed <25 m from the net activated the owl (via transmitter) when at least one of the adults was detected near its nest.

RESULTS AND DISCUSSION

Overall, the mechanical owl was successful in eliciting a stoop from 79% (75/95) of the nesting adults. This response was slightly lower than the 93% Gard et al. (1989) reported when using a live great horned owl on American kestrels, but considerably higher than the 33% they found with a mounted great horned owl. Fifteen of the 20 adults that did not attack the mechanical owl vocalized for >15 min before leaving the area. The remain-